COURSE DESCRIPTION CARD- SYLLABUS

Course name
Computer-aided design of power devices

Course

Field of study
Mathematics in Technology
Area of study (specialization)
—
Level of study
first-cycle studies
Form of study
full-time

Year/Semester
4/7
Profile of study
general academic
Course offered in
Polish
Requirements
elective

Number of hours

Lectures
15
Tutorials
—
Laboratory classes
15
Projects/seminars
15
Other (e.g. online)
—

Number of credit points

4

Lecturers

Responsible for the course/lecturer::

dr hab. inż. Hubert Morańda, prof. PP

Responsible for the course/lecturer::

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Prerequisites

Student starting classes has ordered and theoretically founded knowledge in computer science, including numerical methods. He/she should knows one programming language. He/She can work individually and in a team. He/she knows how to estimate the time needed to complete the task ordered. He/she is able to develop and implement a schedule of works to ensure that the deadline is met. He/She is able to think and act in a creative way, taking into account safety, ergonomics and economic aspects. He/she is aware of the need to initiate actions for the public interest and responsibility for the work results of the team and individual participants.

Course objective

Familiarization of the students with selected numerical methods supporting the process of modeling physical phenomena and designing electrical power devices.

Course-related learning outcomes

Knowledge

- student has structured and theoretically founded knowledge in the field of technical sciences, including electrical and power engineering;
- he/She has structured and theoretically founded knowledge related to the design, construction, operation principle and operation of devices, machines, and insulation systems. He/she knows and understands the processes occurring in their life cycle.

Skills

- student can construct an algorithm for solving a simple engineering task and implement and test it in a chosen programming environment;
- he/She can formulate an engineering problem, conduct analyzes and simulations, then interpret the results obtained and draw conclusions;
- he/She is able to prepare documentation related to the implementation of an engineering task using specialized terminology;
- he/She is able to use a foreign language sufficiently to communicate, and reading comprehension of mathematical texts, technical documentation and similar documents.

Social competences

- student is aware of the level of his knowledge in relation to the conducted research in sciences and technical sciences;
- he/She has the awareness of deepening knowledge to solve newly created technical problems.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired during classes is verified during the implementation of tasks in the simulator of artificial neural networks. In addition, at the beginning of each project classes, student's knowledge can be checked by the teacher orally or in writing.

Programme content

Update: 10.09.2020r.

Introduction to handle of artificial neural networks (ANN) simulator. Exercises with training data input to SSN and a description of the data. Creation and training the ANN simple math equation using the default values

of the program. Study of the influence the changing ANN simulator's parameters on results of its learning. Presentation of ANN work. Learning the ANN to recognize states of logic gates. The use of ANN for modeling curves describing the results of measurements. The use of ANN for modeling of social phenomenon. Designing SSN to identify defects in the chosen insulation system.

Teaching methods

A multimedia presentation illustrated with examples given on a blackboard and performing tasks given by the teacher – practical exercises.

Bibliography

Basic

- Korbicz J., Obuchowicz A., Uciński D., Sztuczne sieci neuronowe: podstawy i zastosowania, Akademicka Oficyna Wydawnicza PLJ, Warszawa, 1994.
- Rybarczyk A., Sztuczne sieci neuronowe: laboratorium, Wydawnictwo Politechniki Poznańskiej, Poznań, 2008.
- Żurada J., Barski M., Jędruch W., Sztuczne sieci neuronowe: podstawy teorii i zastosowania, Wydawnictwo Naukowe PWN, 1996.

Additional

- Bernat J., Gielniak J., Morańda H., Program komputerowy wykorzystujący sztuczne sieci neuronowe do interpretacji wyników badań przy użyciu metody RVM w celu oceny zawilgocenia izolacji papierowej transformatorów, Przegląd Elektrotechniczny, T. 84, Nr 10/2008, s. 5-7.
- Bartecki K., Sztuczne sieci neuronowe w zastosowaniach: zbiór ćwiczeń laboratoryjnych z wykorzystaniem przybornika Neural Network programu Matlab, Skrypt Politechniki Opolskiej nr 289, Oficyna Wydawnicza Politechniki Opolskiej, 2010.

Breakdown of average student's workload

	Hours	ECTS
Total workload	105	4,0
Classes requiring direct contact with the teacher	50	2,0
Student's own work (literature studies, preparation for project exercises, work on exercise tasks outside classes, preparation of final project and writing a report on this project)	55	2,0